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## The American Association for the Advancement of Science:

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## AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

### PRELIMINARY ANNOUNCEMENT OF THE THIRD PITTSBURGH MEETING

Edited by Dr. HENRY B. WARD

PERMANENT SECRETARY

#### INTRODUCTION

THE city of Pittsburgh is to be host to the ninety-fifth meeting of the association, which will open on Thursday, December 27, 1934. This will be the third meeting of the association held there. The programs outlined in this report show that important announcements have been prepared by secretaries of sections and cooperating organizations; these will be fully described in the printed program available to members and others registering in Pittsburgh. Previous meetings in this city were marked by events of especial significance in the history of the association, and the approaching meeting bids fair to be no less important.

The association held its first meeting in Pittsburgh in June, 1902. This was the fifty-first annual meeting and was especially noteworthy in the history of the

association for the adoptions of changes in plans previously followed. The annual meeting was moved from summer to Convocation Week and the first session under this plan set for Washington in December of the same year. The first Pittsburgh meeting was also distinguished in the character of its program. The volume of Proceedings, issued by the permanent secretary, Dr. L. O. Howard, was the largest and most impressive of the series to that date. This occasion marked the start of a rapid development in the membership and influence of the association.

The second Pittsburgh meeting, which was the seventieth meeting of the association, was held in December, 1918. The program was devoted to national preparation and efficiency, and commanded widespread attention in the public press.

The coming meeting will constitute thus the third

in Pittsburgh. Welcoming the association as hosts are the Carnegie Institute of Technology, Duquesne University, Pennsylvania College for Women, and the University of Pittsburgh, together with the Chamber of Commerce representing the extensive manufacturing, financial and other interests of the city.

Pittsburgh offers varied, interesting features of significant character for all sections of the association. Established as a military post of early colonial days at the confluence of three rivers, it was the scene of important historical events; and by virtue of location and natural resources, soon came to be a center of mining, manufacturing and commercial activity out of which has developed the great city of to-day.

The first educational institution west of the Alleghenies was established here in 1787. To-day, grouped together on a prominent site above the "Golden Triangle," the principal business area of the city, is a magnificent series of educational and social enterprises housed in imposing structures and grouped in a beautiful setting of boulevards and parks. This is the region in which will be held most of the sessions as well as the social events of the Pittsburgh meeting. On one side lies Schenley Park, fronted by the Carnegie Museum, the Carnegie Library and Music Hall and the Carnegie Institute of Technology. Near this is the Pittsburgh station of the U. S. Bureau of Mines, a modern experimental laboratory. A little further out is located the Pennsylvania College for Women.

Across from the Schenley Park group is located the University of Pittsburgh. The towering Cathedral of Learning, though not yet fully completed, is much in use and will shelter numerous meetings. From the observation room in the top of its tower can be seen in clear weather the extent of the city and also a wide expanse of western Pennsylvania. The Medical Center, the Heinz Chapel and other prospective structures are in this group, while the University Club, the Pittsburgh Athletic Club and buildings of other social and municipal organizations are located nearby, as well as the Hotel Schenley, headquarters of the association for the meeting.

Pittsburgh was in truth the first manufacturing city of the Union, and discoveries of iron ore and abundant supplies of coal and later oil and gas enabled it to keep its place during the industrial expansion of the United States during the nineteenth century. Rapid development of transportation, discoveries of new resources, improved technical processes and the creation of vast organizations by a group of able and far-sighted leaders accelerated in recent years the development of the previous period and made the great city of to-day. The secret of its success was first of all the application of science to the utilization of natural resources. The variety and

extent of Pittsburgh's activities in both pure and applied science afford opportunities for observation and study that will appeal strongly to the members of the American Association. One of the natural products of this strenuous and successful utilization of science is the Mellon Institute of Industrial Research and in its new building one entire floor is used first at this meeting to house the association exhibition of the progress of science.

#### HOTEL HEADQUARTERS

General headquarters for the association, including sections, will be at the Hotel Schenley. Since not all can be accommodated at the Hotel Schenley, a large number of the downtown Pittsburgh hotels are available. Headquarters for the various special societies have been assigned as follows:

*Schenley:* American Society of Zoologists; American Society of Parasitologists; American Society of Naturalists; Society of the Sigma Xi; Pi Gamma Mu.

*Webster Hall:* American Mathematical Society; Mathematical Association of America; National Council of Teachers of Mathematics; American Physical Society; American Association of Physics Teachers; Acoustical Society of America; American Society for Horticultural Science.

*Fort Pitt:* Ecological Society of America; Wilson Ornithological Club.

*Henry:* American Meteorological Society.

*Pittsburgher:* American Anthropological Association; American Folk-Lore Society.

*William Penn:* American Association of Economic Entomologists; Entomological Society of America; Botanical Society of America; American Phytopathological Society; American Society of Plant Physiologists; Mycological Society of America; American Society of Agronomy; Potato Association of America; American Nature Study Society.

*Pennsylvania College for Women:* Genetics Society of America.

#### RAILROAD RATES

Reduced railway rates on the receipt certificate plan have been granted by almost all railroads in the United States and Canada. Persons attending the meeting should purchase a first-class, one-way ticket to Pittsburgh, securing a receipt certificate reading "For the American Association for the Advancement of Science and Associated Societies." The certificate must be left at the registration desk to be called for later in the same place. Each person presenting an endorsed and validated certificate may purchase a return ticket for one third of the regular fare on the same route as used in going to Pittsburgh. Tickets to Pittsburgh from many points may be purchased between December 24 and December 29, although from far western points they may be purchased at

early as December 15. Return tickets must be purchased by January 6, 1935.

Special round-trip railway fares have been announced by the Central and Trunk Line passenger associations. These associations cover points east of and including Chicago and St. Louis north of the Ohio and Potomac Rivers to the Atlantic Seaboard south of New England and Canada. Tickets will be on sale from December 21 to 25 inclusive, for trains leaving starting points at and after 12 o'clock noon of December 21 to and including 12 o'clock noon of December 25. Final return limit is January 6, 1935. In connection with these round-trip holiday fares, the Pullman Company has authorized reduced rates for round-trip Pullman tickets.

In view of possible further reduction of fares and the various periods when going tickets may be purchased on the certificate plan, it is advisable to consult the local ticket agent.

#### REGISTRATION

The main registration headquarters will be in the new building of Mellon Institute for Industrial Research, where registration facilities will be opened on Thursday, December 27, and maintained throughout the meeting. Any one interested in the advancement of science or education may register upon payment of the registration fee of \$1.00.

Each registrant receives a copy of the General Program, an identification card and a badge. Registration is necessary to obtain validation of certificates for reduced railway fares. Each registrant is entitled to the validation of his own railway certificate. At the registration desk reservations may be made for all excursions and banquets. The registration desk will also handle all mail, telegrams, etc., and furnish information as desired.

#### GENERAL SESSIONS

The evening sessions of the association will all be held in Carnegie Music Hall and will open at 8:15. On Thursday the program will include a welcome to the association and associated societies extended formally by representatives of the city and the host institutions. The speaker and topic for the main address to follow the preliminary program will be announced later. The address will be followed by a reception tendered to the association and guests by the Pittsburgh Local Committee.

On Friday evening the Sigma Xi address is to be given by Professor E. A. Hooton, of Harvard University, on the topic, "Homo sapiens, Whence and Whither." Friday evening also is announced for the address of Professor Arthur B. Lamb, of Harvard University, retiring vice-president of the section on

chemistry. He will speak on "Crystallogenetic Adsorbents."

On Saturday evening Dr. C. F. Kettering, retiring vice-president of the section on engineering, will deliver his address in Carnegie Music Hall. This address will be preceded by an organ recital regularly given on this evening by Dr. Marshall Bidwell. On Saturday evening also is given the address of the president of the Naturalists, Dr. A. Franklin Shull, professor of zoology, University of Michigan, on "Weismann and Haeckel: One Hundred Years."

Monday evening is devoted primarily to the address of the retiring president, Dr. Henry Norris Russell, who has chosen for his subject "The Atmospheres of the Planets."

Among the important scientific addresses of the meeting is a series of special lectures to be given at 4:30 in the afternoon. Dr. Cyrus C. Sturgis, director of the Department of Internal Medicine at the University of Michigan, will speak on Thursday afternoon on the subject, "Review of Some of the More Important Recent Advances in the Study of Blood Diseases." This is the address of the retiring vice-president of the section on medical sciences.

Professor H. H. Newman, of the University of Chicago, will give the Friday afternoon address on "Twins Reared Apart and the Nature-Nurture Problem." The address will be illustrated by lantern slides.

Dr. Mark H. Liddell, emeritus, of Purdue University, will deliver a demonstration lecture on Saturday afternoon on "The Auditory Spectrum," demonstrating the new theory of audition which he has developed during several years with the assistance of a grant-in-aid from the association. Professor C. T. Knipp, of the University of Illinois, will conduct experiments with the Knipp singing tubes in connection with the lecture.

#### VICE-PRESIDENTIAL ADDRESSES

The addresses of the vice-presidents are announced in the subjoined schedule and are arranged in the order of the calendar:

*Section on Physics (B):* Thursday, 2:00 P. M. Dr. C. J. Davisson, of the Technical Staff of Bell Telephone Laboratories, on "Electron Optics."

*Section on Medical Sciences (N):* Thursday, 4:30 P. M. Dr. Cyrus C. Sturgis, of the University of Michigan, on "Review of Some of the More Important Recent Advances in the Study of Blood Diseases."

*Section on Agriculture (O):* Friday, 9:30 A. M. Dr. A. R. Mann, of Cornell University, on "Agricultural Planning as an Aspect of State and National Planning."

*Section on Botanical Sciences (G):* Friday afternoon. Professor K. M. Wiegand, of Cornell University, on "A Taxonomist's Experience with Hybrids in the Wild."

*Section on Chemistry (C):* Friday evening. Professor Arthur B. Lamb, of Harvard University, on "Crystallogenic Adsorbents."

*Section on Zoological Sciences (F):* Friday evening. Dr. George L. Streeter, of Carnegie Institution, Baltimore, Maryland.

*Section on Anthropology (H):* Friday evening. Dr. T. Wingate Todd, of Western Reserve University School of Medicine, on "Anthropology and Growth."

*Section on Psychology (I):* Friday evening. Professor Walter R. Miles, of Yale University, on "Training, Practice and Mental Longevity."

*Section on Education (Q):* Friday evening. Dr. Walter F. Dearborn, of Harvard University.

*Section on Engineering (M):* Saturday evening. Dr. Charles F. Kettering, president of General Motors Research Corporation.

*Section on Mathematics (A):* Monday morning. Professor C. N. Moore, of the University of Cincinnati, on "Mathematics and Science."

*Section on Geology and Geography (E):* Monday, 11:00 A. M. Dr. Rollin T. Chamberlin, of the University of Chicago, on "Certain Aspects of Geologic Classifications and Correlations."

*Section on Astronomy (D):* Monday afternoon. Dr. V. M. Slipher, of the Lowell Observatory.

*Section on Social and Economic Sciences (K):* Monday evening. Professor Wesley C. Mitchell, Columbia University, retiring vice-president, Section K, on "National Planning."

"The Invisible Hand of Adam Smith," by Carl Snyder, Federal Reserve Bank of New York, vice-president, Section K.

#### SOME IMPORTANT EVENTS

The Josiah Willard Gibbs lecture was established in 1923 by the American Mathematical Society, which provides for the speaker and all arrangements connected with the occasion. This year Professor Albert Einstein, of the Institute for Advanced Study, has consented to deliver the address. This, which is the eleventh of the series, is to be given in the Little Theater of the Carnegie Institute of Technology at 4:30 Friday afternoon. Owing to the technical character of the address and limited accommodations available, admission will be exclusively by ticket. The address will be in English. Arrangements for the distribution of tickets are in the hands of the American Mathematical Society.

The Committee on the Place of Science in Education has arranged for a luncheon and special program on Saturday as was requested at the Boston meeting. Further details may be found in a separate announcement recently published (SCIENCE, November 9, v. 80, p. 424). The importance of the problems under discussion is well recognized and the continued activity of the committee greatly appreciated.

The Academy Conference will be held on Thursday. The luncheon for delegates will be served promptly

at noon at the Schenley Hotel. The program will be taken up directly thereafter in the same room, since adjournment must be reached at 2:50 in order that officers and other members may report at the meeting of the council, which is called for 3 P. M. It is hoped that most delegates to the Academy Conference may be able to assemble in the luncheon room by 11 A. M. for an informal discussion before luncheon is served. Further details regarding the event will be sent to delegates by mail from the secretary of the conference, Dr. S. W. Bilsing, Texas A. and M. College, College Station, Texas.

The Secretaries' Conference is called this year for Sunday morning at the Hotel Schenley. In view of the afternoon lecture and the concert tendered the association, it is hoped that the discussion may be concluded before dinner is served at 12:30. More precise information will be sent to members of this conference by the secretary, Professor Mark H. Ingraham, of the University of Wisconsin.

#### PRESS SERVICE

Every one who is to present a paper at the Pittsburgh meeting is requested to send to the Press Service as long in advance as possible two complete copies of the paper, accompanied by two abstracts.

In connection with the Pittsburgh meeting there will be held a symposium on the relation between science, and especially scientific organizations and institutions, and the press. There will be speakers from leading universities, technical and medical schools who will outline the policies of their institutions, and also speakers from the National Association of Science Writers, Science Service, the Associated Press, the Hearst Service, and representative newspapers such as the *New York Times* who will give the association the benefit of their experience and explain their point of view. It is expected that the increasingly important subject of the newspaper as a factor in adult education in science will also be discussed.

This symposium will be held in the Patio of the Hotel Schenley on Sunday, December 30, beginning at 10:00 A. M.

#### SCIENCE EXHIBITION

The annual science exhibition this year is to be held in the new Mellon Institute of Industrial Research building. The extent and the quality of the exhibits are far in excess of those in recent years. Not only have leading research laboratories of educational institutions joined, as heretofore, but many new associations of national recognition have joined, such as the American Medical Association, the American Dietetic Association, the American Institute of Physics, including the large number of societies which are

a part of the association. There are new features and new types of exhibitors, such as the National Geographic Society-Army Air Corps Stratosphere Flight exhibition.

The Mellon Institute will have a space where visitors will be informed with reference to that institution and to the special features of the new building, and where plans may be made for seeing the special research laboratories in and about Pittsburgh. The reception room and lounge will be especially arranged through the courtesy of the Aluminum Company of America. The Science Library, adjoining the lounge, will have the 1934 science books. Altogether the science exhibition this year should be the outstanding common interest of all the different groups meeting in Pittsburgh. It is hoped that it will be of such high merit that some will come to the meetings especially to see this exhibition.

#### SOCIAL AFFAIRS

The joint smoker of the biological societies is to be held this year as usual, on Friday evening, after the dinner and general sessions, in order to avoid conflicts with events announced for the early evening hours.

A similar event, arranged this year for the first time, is a joint smoker for sections in mathematical, physical and engineering sciences to be held on Saturday evening after the general session which includes that evening the address of the retiring vice-president of the section on engineering.

For Thursday evening have been announced group dinners for ecologists, horticulturists, phytopathologists and plant physiologists.

Friday evening dinners include those of the botanists, chemists, entomologists, physicists and zoologists as well as the Sigma Xi buffet supper preceding the Sigma Xi address on that date. A joint dinner for members of the Sections on Psychology and Education has also been arranged for that evening.

Saturday evening includes primarily the dinner of the Naturalists, following which is given the address of the president of the society. The mathematical societies are also to have a joint dinner on Saturday evening.

On Friday the geneticists and the parasitologists have arranged for society luncheons and the latter group also for a demonstration tea the same afternoon. Other dinners, luncheons, teas and social gatherings are planned by cooperating organizations which will meet with the association at Pittsburgh. These will be definitely announced in the final program to be secured on registration. Arrangements have been made for members and guests to secure tickets for these events at the information desk in the new Mellon Institute building.

Saturday evening at 8:15 Dr. Marshall Bidwell, organist of the Carnegie Music Hall, will give a special concert recital in honor of the association. Immediately following this recital Dr. C. F. Kettering will deliver his retiring vice-presidential address.

On Sunday afternoon at 2:00 a lecture demonstration on "Ramblings in Research" will be given in Carnegie Music Hall by Dr. Philips Thomas, Research Department, Westinghouse Electrical and Manufacturing Co. This remarkable demonstration includes recent discoveries, never before presented publicly.

A concert follows this address at 4:00, in accordance with the time-honored practise of the Carnegie Institute. The organ in Carnegie Music Hall is one of the largest and best of its type in this country. The regular Saturday evening and Sunday afternoon concerts given by Dr. Bidwell on this organ are a notable feature of the musical life of Pittsburgh.

Sunday evening at 8:15, Dr. Bidwell will give another recital when he will be assisted by the symphony orchestra of the Carnegie Institute of Technology, directed by Professor J. Vick O'Brien, head of the Department of Music. The orchestra is an organization of some eighty musicians. It is a non-professional ensemble of high merit. Members will appreciate deeply the privileges thus extended to them by Dr. Bidwell and by Professor O'Brien and his associates.

An extended program of special attractions for visiting ladies is being prepared by the local committee, including visits to points of historical, artistic and scientific interest. These will cover Thursday, Friday and Saturday at least. The Sunday events arranged for the members of the association are open to ladies accompanying them.

The annual luncheon and meeting of Pi Gamma Mu has been arranged for Saturday at 12:30 at the Hotel Schenley.

Other organizations, which because of conflicts or other difficulties have not yet reached a final decision regarding details of programs in process of adjustment, will be included in the printed program, provided copy can reach the Washington office on or before December 8, but not later. Necessary changes in material included in the present article should be made known as soon as possible in order that the printed program may be both complete and free from errors.

#### SECTIONAL AND SOCIETY PROGRAMS

The Section on Mathematics (A), the American Mathematical Society and the Mathematical Association of America will meet from Thursday, December 27, to Tuesday, January 1; the American Mathematical Society on Thursday afternoon and on Friday and Saturday mornings, and the Mathematical Associa-

tion on Monday afternoon and Tuesday morning with joint sessions on Saturday afternoon and Monday morning.

On Friday afternoon Professor A. B. Coble will deliver his retiring address as president of the Mathematical Society on the subject, "Geometric Properties of the Generalized Weddle Manifold." The joint symposium of mathematicians and physicists on Saturday afternoon will discuss the topic "Group Theory and Quantum Mechanics." Among the speakers will be Professor J. H. Van Vleck, of Harvard University, Professor John Von Neumann, of the Institute of Advanced Study, and Professor E. Wigner, of Princeton University.

On Saturday afternoon, at a joint session Professor W. L. Hart, of Minnesota, representing the Mathematical Association, and representatives of the National Council of Teachers of Mathematics, including Dr. M. L. Hartung, of Wisconsin, will discuss "The Need for a Re-orientation of Secondary Mathematics," from the view-points of: (1) the university professor of mathematics, (2) the general educator and (3) the high-school teacher.

Monday morning will be devoted to a joint session of the section, the Mathematical Association and the society, at which time addresses will be delivered by Professor C. N. Moore as retiring vice-president and chairman of the section, on "Mathematics and Science," and by Professor Arnold Dresden as retiring president of the Mathematical Association.

The session of the Mathematical Association on Monday afternoon will be devoted to a symposium (of non-advanced character) on "Equipotential Loci of Green's Function," under the leadership of Professor J. L. Walsh, with the assistance of Professors Morris Marden and J. J. Gergen. On Tuesday morning Professors A. A. Bennett, T. R. Hollcroft and R. L. Jeffery will deliver addresses before the Mathematical Association.

The National Council of Teachers of Mathematics will meet for the first time under the auspices of the American Association. On Friday evening, Dr. Vera Stanford, of the State Normal School, Oneonta, New York, is to give an address on the general topic, "How to Make Mathematics Interesting." This will be followed by a demonstration to be arranged by the teachers of Pittsburgh showing how they accomplish this aim. The Saturday morning program is devoted to the subject-matter of mathematics. Professor H. W. Brinkman, of Swarthmore College, and Professor C. C. MacDuffee, of the Ohio State University, will make the addresses.

The Section on Physics (B) will meet in conjunction with the American Physical Society. They will join with the Section on Chemistry (C) on Friday in an all-day symposium devoted to the discussion of

"Heavy Hydrogen and Its Products," one half of the day being devoted to the physical aspects of the problem and the other half to the chemical aspects. On Saturday they will join with the mathematicians in a symposium on "Group Theory and Quantum Mechanics." Plans are also being made for a joint meeting with the Acoustical Society of America, this being the first time this society has met with Section B. The address of the retiring vice-president of Section B will be given at a joint meeting of the section with the Physical Society, also an address by one of the officers of the Physical Society. In addition there will be special programs for contributed papers. The keynote of the meeting of the American Association of Physics Teachers is to be "Industrial Physics." This association also plans lectures, demonstrations and trips of inspection to several of the great Pittsburgh industrial plants. The American Meteorological Society will meet on Friday and Saturday and will feature air mass analysis, the modern method of synoptic weather mapping. The presidential address by Dr. I. M. Cline will be on "A Century of Progress in the Study of Cyclones." The Acoustical Society of America will hold sessions on Friday and Saturday.

The Section on Chemistry (C) will join with the Section on Education (Q) on Thursday in a symposium on "The Rôle of Chemistry in Education," in which the Division of Chemical Education of the American Chemical Society will also cooperate. This is expected to include addresses on "The Extent of Chemical Education," "The Cultural Value of Chemistry in General Education," "The Training Value of Chemistry in General Education," "The Prerequisite and Collateral Values of the Subject of Chemistry" and "The Profession of Chemistry." The section will also hold a joint symposium on Friday morning and afternoon with the physicists on the subject of heavy hydrogen. A dinner and evening meeting will be held jointly with the Pittsburgh section of the American Chemical Society on Friday.

The Section on Astronomy (D) will meet on December 31 and January 1. There will be a session for contributed papers on Monday morning. Monday afternoon will be devoted to a joint session with the Section on Geology and Geography (E), at which the address of the retiring vice-president, Dr. V. M. Slipher, of the Lowell Observatory, will probably be given in connection with a special program now being arranged on subjects of common interest to astronomy and the earth sciences. Additional sessions as may be required will be held on Tuesday for further papers. It is hoped that arrangements will be made for visiting points of astronomical interest in the vicinity of Pittsburgh.

The section on Geology and Geography (E) will be

in session on Monday, December 31, and Tuesday, January 1, thus making it possible for members of the Geological Society of America to attend the gathering of geologists in Pittsburgh, following the close of the meetings in Rochester, New York. The address of the retiring vice-president, Dr. Rollin T. Chamberlin, of the University of Chicago, on "Certain Aspects of Geologic Classifications and Correlations," will be delivered at 11:00 A. M. on Monday. Monday afternoon will be given to a joint session with the Section on Astronomy (D) at which papers in the overlapping fields of meteorology and geodesy will be presented. Geological contributions, especially those dealing with the geomorphology, structural geology, seismology, stratigraphy and economic geology of the Appalachian area, will be welcomed for presentation at the sessions to be held on Monday and Tuesday mornings and Tuesday afternoon.

The Section on Zoological Sciences (F) will meet jointly with the American Society of Zoologists on December 27, 28 and 29. Thursday morning will be devoted to the reading of papers. In the afternoon will be held a symposium on "Mitosis," with papers by Drs. F. Schrader, G. Fankhauser, A. F. Heuttner and C. W. Metz. On Friday morning one session is planned for the regular program of papers and two sessions for invited papers, one led by Dr. Robert Chambers on "Cell Physiology," and another, a joint meeting with the American Society of Parasitologists, led by Dr. Wm. H. Taliaferro on "Immunological Phases of Host Parasite Relationship." The afternoon will be devoted to demonstrations. The business meeting of Section F will be held on Friday immediately preceding the business meeting of the zoologists. On Saturday morning sessions are scheduled for the reading of papers and in the afternoon the zoologists will join with the naturalists in a symposium arranged by the naturalists.

The American Society of Parasitologists will hold its meetings on Thursday, Friday and Saturday. Professor E. E. Tyzzer will give his presidential address on Friday morning, followed by the luncheon and annual business meeting. A demonstration tea will be held on Friday afternoon.

The Entomological Society of America will meet on December 27 and 28. On Friday evening the two entomological societies will hold a joint meeting, at which time Dr. C. H. Kennedy, of the Ohio State University, will deliver the annual address of the Entomological Society of America. This will be followed by an entomologists' smoker under the auspices of the American Association of Economic Entomologists. A symposium on "Improved Technique in the Study of Insects," accompanied by displays, is planned for Thursday afternoon and will be of inter-

est to entomologists of all fields. The annual business meeting will be held on Friday afternoon. Entomological exhibits will be placed in a room near its session room.

The American Association of Economic Entomologists has arranged a session for the reading of papers on Saturday morning and a symposium for that afternoon. The latter will be followed by the business session with committee reports and election of officers.

The Wilson Ornithological Club will hold sessions on Friday and Saturday.

The Section on Botanical Sciences (G) will meet in joint session with the Botanical Society of America, the American Phytopathological Society, the American Society of Plant Physiologists and the Mycological Society of America on Friday afternoon. The retiring vice-presidential address by Professor K. M. Wiegand, of Cornell University, on "A Taxonomist's Experience with Hybrids in the Wild," will be followed by a series of invitation papers, including an address by Dr. F. W. Went, of the California Institute of Technology, on the rôle of hormones in plant growth. Mr. K. A. Ryerson will speak on "Plant Trails in North Africa," and Dr. John T. Buchholz will discuss pollen tube growth in relation to genetics.

The Botanical Society of America plans joint sessions as follows: (1) with the Ecological Society of America on Thursday afternoon; (2) with Section G and affiliated societies on Friday afternoon; and (3) with the American Society of Naturalists, the American Society of Zoologists and the Genetics Society of America on Saturday afternoon. Meetings of the sections of the society will occupy the forenoons; some joint sessions of sections with other societies are planned. Botanical exhibits and demonstrations of researches will be displayed in rooms near the session rooms. The annual dinner of the society will be held on Friday evening, following which the presidential address will be given by Professor E. J. Kraus, of the University of Chicago.

The American Society of Plant Physiologists will hold a joint symposium on plant hormones with the physiology section of the Botanical Society of America on Thursday afternoon and a joint session with the American Society for Horticultural Science on Friday morning. At the annual dinner of the society the Stephen Hales Prize award will be made for meritorious work in plant physiology, and a distinguished plant physiologist will be honored by a Charles Barnes life membership. Papers will be read by members of the society on Thursday and Friday mornings and in the morning and afternoon of Saturday.

The Mycological Society of America will meet from Thursday to Saturday, inclusive. The retiring presi-

dent, Professor H. S. Jackson, will address the society at the close of the business session on Thursday morning. A joint session with the American Phytopathological Society will be held on Thursday afternoon and another with Section G on Friday afternoon. Opportunity will be given on Saturday afternoon for the making of demonstrations and the holding of conferences. The remaining sessions will be given over to the reading of mycological papers. The society will unite with the American Phytopathological Society and the Botanical Society of America in the dinners held by these affiliated organizations.

The American Phytopathological Society plans joint sessions as follows: (1) With the Mycological Society of America on Thursday afternoon; (2) with Section G and other botanical societies on Friday afternoon and (3) with the Potato Association of America on Saturday. The annual conference on extension work will be held on Friday afternoon. Business sessions will be held on Thursday and Saturday mornings.

The following societies related to the Sections on Zoological Sciences (F) and on Botanical Sciences (G) have made the following arrangements. The Ecological Society of America has arranged a program to occupy three days, beginning on Thursday, December 27, 1934, with a general session in the morning, preceded by brief discussion of business. In the afternoon it will cooperate with the Botanical Society in a joint session. The informal annual dinner will be at 6:30. For Friday morning an invitation program is planned, with the president's address on post-glacial vegetation of the Lake Michigan region, by Dr. George D. Fuller; an account of a Chilean rain forest in chaparral surroundings by Dr. C. Skottsberg, head of the botanical garden at Götenberg, Sweden; and a description of Pacific Coast dune areas by Dr. William S. Cooper. Friday afternoon is devoted to a joint session with the Society of American Foresters. The principal feature of this session will be an account of the work of the Forest Research Institute at Dehra Dun, India, by Dr. R. MacLagan Gorrie, who is now in this country. Motion pictures of this work will be shown. On Saturday morning comes a joint session for papers on insect ecology, with the Entomological Society of America. A field trip in the afternoon will depend upon favorable weather.

The Society of American Foresters has appointed a committee to maintain cooperative relations with the American Association for the Advancement of Science: Dr. C. F. Korstian, *chairman*, Duke University; Franklin Reed, *secretary*, Society of American Foresters, Washington, D. C.; Dr. S. T. Dana, School of Forestry, University of Michigan; Henry I. Bald-

win, New Hampshire State Forestry Department, Hillsboro.

The Genetics Society of America will hold its regular sessions for reading papers on Thursday, Friday and Saturday mornings and its annual luncheon Friday noon at the Pennsylvania College for Women. Afternoons will be devoted to demonstrations of genetic material at the Biological Laboratories of the University of Pittsburgh.

The American Society of Naturalists is again sponsoring the annual Biologists' Smoker on Friday late in the evening. The annual symposium, a joint session with Sections F and G, including the Botanical Society of America, the American Society of Zoologists and the Genetics Society of America, will be held on Saturday afternoon; the topic is "Cytogenetic Evolutionary Processes and Their Bearing on Evolutionary Theory." The speakers will be Dr. M. Demerec, Dr. R. A. Brink and Dr. C. L. Fenton. The annual dinner of the Naturalists has been planned for Saturday evening, at which time the president, Dr. A. F. Shull, will deliver his retiring address, entitled "Weismann and Haeckel: One Hundred Years." Dr. C. E. McClung and Dr. C. E. Allen will also speak.

The American Nature Study Society meets on December 27 and 28. The sessions of the first day are meetings of small groups with common interests and common problems; several unrelated groups meet simultaneously. The subjects for discussion are "Teacher Training," "Adult Education," "Problems of the Varying School Levels," "Research," "Curricula," "Outdoor Activities," "Museums and Libraries," "Clubs," "Chapters," "Exhibits and Teaching Aids." The annual business meeting will occur at the end of the first day's session. During the second day men in various fields of natural science will present illustrated discussions concerning their particular subjects. The annual dinner will be followed as usual by an illustrated lecture. An exhibit will be made illustrating the work of the society.

The American Microscopical Society will hold its annual business meeting on Saturday at 4:00 P. M.

A special program of papers in the field of hydrobiology and aquiculture, such as was given at New Orleans, Des Moines and Cleveland, will again be offered at the coming Pittsburgh meeting. Professor J. G. Needham, of Cornell University, is the chairman of the committee in charge.

The Section on Anthropology (H) is meeting jointly with the American Anthropological Association and the American Folk-Lore Society, from December 27 to 29. Thursday morning will be devoted to papers on folk-lore. On Thursday afternoon will be held two round-tables, meeting concurrently.

Dr. Warren K. Moorehead will preside at a discussion on the "Distribution of Stone-Axe Types," and Dr. Griffith Taylor will lead a discussion on the "Zones and Strata" theory of racial distribution. On Friday morning a symposium on "Social Anthropology" is planned, with papers by Dr. E. Sapir, Dr. Ralph Linton and Dr. A. T. Hansen. The afternoon session will center upon "Problems of Chronology in the Americas," with papers by Dr. W. D. Strong, Dr. T. Deuel, Dr. W. A. Ritchie and Miss Florence Hawley. On Friday evening, at the annual dinner, Dr. T. W. Todd will give the address of the retiring section vice-president on the subject of "Anthropology and Growth." Saturday morning will be devoted to physical anthropology, while the afternoon will be given over to general anthropology.

The Section on Psychology (I) will meet from December 27 to 29. A strong program for each of the sessions is being arranged. A joint meeting with Section Q (Education) is planned for Friday afternoon, at which papers on some topic of interest to the members of both sections will be read and discussed. On Friday evening at a joint banquet of the Sections on Psychology (I) and Education (Q) addresses will be given by Professor Walter R. Miles, of Yale University, retiring vice-president of Section I, on the subject, "Training, Practice and Mental Longevity," and Professor Walter Dearborn, of Harvard University, retiring vice-president of Section Q.

The Section on Social and Economic Sciences (K) will hold sessions on December 29 and 31 and January 1. The programs will deal with certain aspects of contemporary economic and social problems under the New Deal, with invited papers by distinguished men in various fields. The progress of world recovery will also be discussed on the basis of the statistical record. This topic will be handled in a symposium on Saturday with speakers presenting the situation in the United States, England and the British Commonwealth, Germany, the Gold Bloc and the Far East.

Monday's program takes up successively "Monetary and Fiscal Problems," "Agricultural Control" and the "Housing Problem"; on Tuesday the program will deal with "Control of Industry," "Problem of Economic Security," "Future of the Export and Import Trade," "Problem of the Consumer," and "The Role of the State in an Industrial Society." In each case the question will be discussed from various points of view. Contrary to the usual plan, vice-presidential addresses will be given by both the retiring and the active officers; these are listed in the Monday afternoon program.

The Section on Historical and Philological Sciences will hold a joint session with the Section on Engineering in conjunction with the Historical Society of Western Pennsylvania in the Historical Building on

Monday. The general topic of the meeting will be "Science and Technology in Western Pennsylvania." Other joint sessions are being arranged.

Special attention is also directed to the demonstration lecture by Dr. Mark H. Liddell, with demonstrations by Dr. C. T. Knipp. This is to be given on Saturday at 4:30 on the subject, "The Auditory Spectrum."

The Section on Medical Sciences (N) will hold sessions for the reading of papers on the mornings of Thursday, Friday, Saturday and Monday, December 27 to 31, and on Monday afternoon. On Thursday at 4:30 Dr. Cyrus C. Sturgis, retiring vice-president and chairman of the section, will present an address dealing with a "Review of Some of the More Important Recent Advances in the Study of Blood Diseases." The Thursday morning session will be devoted to papers dealing with recent advances in the study of poliomyelitis. Among those who will take part in this program are Dr. W. Lloyd Aycock, Harvard University; Dr. John A. Kolmer, Philadelphia, Pennsylvania; Dr. Maurice Brodie, Department of Health, City of New York, and Dr. Claus W. Jungeblut, Columbia University. The sessions on Friday and Saturday will be devoted to symposia on "The Chemistry and Metabolism of Sulphur Containing Compounds of the Body." Among those taking part in these symposia will be Dr. H. B. Lewis, University of Michigan; Dr. E. Brand, New York State Psychiatric Institute and Hospital; Dr. B. H. Nicolet, U. S. Department of Agriculture; Dr. F. S. Hammett, Lankenau Hospital, Philadelphia; Dr. M. X. Sullivan, Georgetown University; Dr. Carl Voegtlin, National Institute of Health; Dr. Howard Mueller, Harvard University; Dr. J. C. Andrews, University of Pennsylvania, and Dr. Vincent du Vigneaud, School of Medicine, George Washington University.

The section will hold morning and afternoon sessions on Monday, and the papers to be presented deal with various topics. Among the speakers are Dr. Frederick P. Gay, Columbia University, on "Unsolved Problems of Leprosy"; Dr. Louis A. Julianelle, Washington University, on "Trachoma"; Dr. Rolla E. Dyer, National Institute of Health, on "Typhus Fever"; Dr. Allan Winter Rowe, Evans Memorial, on "The Standardization of Normal Controls"; Dr. Reuben L. Kahn, University of Michigan, on "Immunologic Nature of Allergic Skin Tests"; Dr. Leland W. Parr, School of Medicine, George Washington University, on "Biochemical Variations in Colon-Aerogenes Strains Which Suggest Mutation and May Explain *B. coli Mutabile*"; Dr. Alden F. Roe, School of Medicine, George Washington University, on "The Preservation of Anaerobes by Desiccation"; Dr. John H. Hanks, School of Medicine, George Washington

University, on "Mechanism of Tuberculin Hypersensitiveness: The Bacterial Factors Which Promote the Tuberculin Type of Hypersensitiveness." Other speakers who will present papers at these sessions are Ruth R. Puffer, Department of Health of Tennessee; Dr. George L. Waldbott, Detroit, Michigan; Dr. Malcolm H. Soule, University of Michigan; Dr. R. H. McClellan and F. C. Messer, Pittsburgh, Pennsylvania; Dr. Louis F. Bishop, New York City; R. C. Grauer and G. H. Robinson, Pittsburgh, Pennsylvania.

The American College of Dentists is planning a program for Saturday. Morning, afternoon and evening sessions will be held, the last to be preceded by a dinner.

The Section on Agriculture (O) will present programs on Friday morning and afternoon on the general subject of agricultural planning. As a part of this symposium at 9:30 A. M. Dr. A. R. Mann, of Cornell University, retiring vice-president, will deliver an address on "Agricultural Planning as an Aspect of State and National Planning." It is purposed to have the administrative aspects of the subject presented by one of the national administrators of the A.A.A. Other subjects to be discussed include population trends, land inventories and land classification, live-stock problems, horticultural aspects, the place of forestry in agricultural planning, soil erosion control, the meat-packing industry and taxation changes in relation to planning. These subjects will all be discussed by leaders in the various fields.

The American Society for Horticultural Science plans joint sessions with other organizations as follows: (1) With the American Society of Plant Physiologists on Friday morning, the program being devoted to physiological problems with horticultural plants; (2) with the Potato Association of America on Friday afternoon.

The Northeastern Section of the American Society of Agronomy is planning to present a program on Saturday, which will probably consist of a discussion of various soil research problems, pasture problems and possibly one or two problems on the microchemical tests of soil.

The Section on Education (Q) plans three joint programs and three sectional meetings. On Thursday afternoon will be held a joint session of Section C (Chemistry) and Section Q (Education) with the cooperation of the Division of Chemical Education of the American Chemical Society. The central theme of the program will be "The Rôle of Chemistry in Education." The Friday morning session will consist of detailed reports on selected experimental problems in education. The Friday afternoon session will be held jointly with the Section on Psychology and will relate to "Psychological Theories of Learning." At the annual dinner of the Section on Psychology and Education, to be held on Friday evening, the retiring vice-presidents of the two sections will present the customary addresses. On Saturday reports of research from members of the section will be included in programs of two sessions.

## THE NEW OBSERVATORY AT PRINCETON UNIVERSITY

By Dr. FRANK SCHLESINGER

DIRECTOR OF YALE OBSERVATORY

THE period immediately following our civil war was one of great activity in telescope building and gave this country a high standing with regard to astronomical equipment that it has maintained ever since. It was during these years that the great refractors at Princeton (23-inch), Washington (26-inch) and the University of Virginia (26-inch) were erected, each of them for a time unsurpassed as to size and power and all of them the product of Alvan Clark's unprecedented skill in making great lenses. A good lens resembles a precious stone in never losing its value, and though its setting may be badly worn or otherwise out of date the stone itself does not deteriorate. The three glasses we have mentioned, as well as some older ones, are still busily engaged in astronomical work, but almost all of them have been reset in modern mountings. This has just become true

of the Princeton telescope. The gift of General Halsted, this instrument was erected in 1867 on land donated by Dr. Cortlandt van Rensselaer not far from the center of the campus, a location that grew less and less advantageous as the university expanded, and more and more desirable from other academic points of view. Two years ago the trustees tore down the old observatory and erected in its place a handsome dormitory. The New Observatory, as it is now officially to be called, is in the center of a large field east of Palmer Stadium far removed from the city's lights and other similar disturbances. Furthermore the trustees have given assurance (and such assurance is essential) that no buildings that could interfere with the work of the telescope will be erected within the extensive "observatory area."

Not only is the new location much better than

the old, but the mechanical arrangements have been immeasurably improved. A new mounting and a new dome have been installed by J. W. Fecker of Pittsburgh. The eye-end of a large telescope varies in its distance from the floor of the observatory, depending upon whether the object observed is high or low in the sky. To reach it in all its positions a glorified step-ladder was the best expedient that the early designers for such telescopes could provide. When the Lick Observatory was erected on Mount Hamilton in the late eighties, this problem of reaching the telescope in all positions became acute on account of the great length of the tube. A distinguished amateur astronomer, A. A. Common, of London, England, suggested that the Lick Observatory floor be made movable in height like an elevator sixty feet in diameter. This expedient was adopted and proved so successful that it has been employed for almost all large telescopes erected or remounted since that time. Such a "rising floor" has been installed in the New Observatory at Princeton together with all the other mechanical improvements that modern practise has shown to be so conducive to rapid and accurate observation with one of these great engines of research. A novel feature of this telescope is an iris diaphragm in front of the lens, in principle like that on an ordinary camera. This will enable the observer to alter the effective aperture of the telescope at will.

The Princeton Observatory has had two distinct periods of fruitful activity. The first fell in the closing two decades of the last century when Charles Augustus Young pursued with such signal success his pioneer work in solar spectroscopy. The second began about a quarter of a century ago and is still in healthy progress. It was then that Professor Raymond S. Dugan, who is in immediate charge of the telescope, began a remarkably careful and thorough investigation of stars that vary in their light. More than to any other single factor we owe to his persistence in adhering under unfavorable circumstances to his original program our minute knowledge of eclipsing variables. It is a matter of satisfaction to all astronomers that he and his pupils are to continue this work under such vastly improved conditions.

In another field the observatory and the department of astronomy at Princeton have made a striking record. In spite of the difficulties of handling the old telescope, or possibly because of them, the institution has sent out a steady flow of competent astronomers. These include among others H. N. Russell himself, the eminent head of the department since 1912; J. Q. Stewart, also at Princeton; the late J. M. Poor, of Dartmouth; Daniel, at Allegheny; Joy and Dunham, at Mount Wilson; Shapley and Menzel, at Harvard; Kovalenko, at Swarthmore; Sitterley, at Wesleyan, and Bennett at Yale.

## OCEANOGRAPHICAL WORK AT BERMUDA OF THE NEW YORK ZOOLOGICAL SOCIETY

By Dr. WILLIAM BEEBE

1934 marks the sixth year of oceanographic work at Nonsuch, Bermuda, by the Department of Tropical Research of the New York Zoological Society. Sponsored by the National Geographic Society, the bathysphere was again put into commission.

The great steel ball was brought from Chicago, where it has been on exhibition for a year, and completely overhauled. With the expectation of remaining submerged for several hours and reaching a depth of three thousand feet, it was found necessary to replace all the quartz windows and remodel the oxygen and purifying apparatus. Mr. Barton joined me, his special province being, at his request, an attempt at abyssal photography.

After several thorough tests in the field we made two deep dives, Numbers 30 and 32, on August eleventh and fifteenth, to depths, respectively, of 2,510 and 3,028 feet. These figures, merely as new records, are

of little importance in themselves, but in the course of the dives several interesting generalizations came to notice.

The publicity given to these descents has been all by indirect reporting, and so confused in details that a brief, preliminary statement seems worth while. As I am still making dives to 1,500 and 2,000 feet as well as contour dives, no opportunity has offered itself of working over the specific observations.

The day of the first dive was an exceedingly brilliant one, and the surface of the sea very calm. In consequence, light was still visible to the eye at 1,900 feet, 200 feet farther than on any previous dive to this depth. At 2,000 feet not the slightest hint of illumination was observable.

A problem of color not yet explained is that from 200 feet down, through the spectroscope, the blue is gradually replaced by violet, until at a depth of 400

feet the latter color is dominant. Yet to the eye, at no time of the descent is there any trace of violet or lavender, only the strongest of blues, appearing brilliant long after it has lost all power for actually seeing anything in the bathysphere.

A new system of purification was devised by the Air Reduction Company, a small electric blower forcing a complete circulation of all the air in the bathysphere over soda lime and calcium chloride every minute and a half. The oxygen supply was cut to one liter per person. Two newly designed valves and two tanks were ready for use on each dive.

After three hours and ten minutes of complete sealing, air and water tight, in this four-foot-six sphere, we found the enclosed atmosphere fairly dry and perfectly fresh, and the accumulated pressure almost negligible, about equal to that at a depth of four fathoms in the diving helmet.

The observation facilities were excellent. The first animal lights were seen at 680 feet, and there appeared to be a slow but appreciable increase in number to the deepest depth, and in relative size to 2,500 feet. The most apparent fact was an increase in the number of large fish from 2,300 feet down to 3,000. By "large," I mean from three feet up. As on previous dives I saw indefinite shapes of unusual size near the farther end of the beam, but at 2,450 feet on August fifteenth I had a clear view of the outline of a really large fish or cetacean as it passed slowly through the electric light path. At a conservative estimate it was twenty feet long and six deep. It possessed no photophores whatever, as far as I could see, and the eye, mouth and fins were too faint for description. The skin was not black, but brownish.

Several detailed descriptions were obtained of new forms, sufficiently exact to allow reproductions to be made. Some belonged to known families, others were quite unlike any.

Luminescent plankton, so characteristic of surface waters, was totally absent at all considerable depths, and the passage even of fish of good size was indicated only by the light from our electric beam, or by flashes from definite organs on their own bodies. The clarity of the water and freedom from sediment did away with all dilution or refraction of light, and each photophore shone strongly and distinctly in the utter blackness. Reflection was marked, as when photophores were reflected on the eye or the skin of the owner, or when some brilliant flash lighted up my face and the inner sill of the window.

On dives of former years and on the early part of Number 30, I reported small, dim fish of uncertain form as not uncommon, although these were not far from the window. Also that from time to time, some organism struck the glass and exploded. I discovered

on the last dive that the cause of these phenomena was the fluid ejected by shrimps, *Acanthephyra* and others. Two kinds of emanation were observed, one, a homogeneous, luminous cloud which diffused with great rapidity at first, and then hung suspended for considerable time as a faintly luminous area. The other was a discharge of a multitude of very bright sparks, which died out much sooner than the first type. These sparks were much more startling, making us jerk back our heads as from a blow when they occurred close against the glass.

The remarkable abundance of animal life which came within our exceedingly limited visual area at almost all depths was wholly unexpected. I have drawn over fifteen hundred meter nets in these very waters, from the surface to 1,200 fathoms, and the average per meter net for a four-hour haul, while not below the average oceanic catch, is negligible compared with what we saw on any single vertical descent or ascent. We can account for this either by the creatures being attracted from all directions to the bathysphere and our occasional strong light, or by an admission of the actual, wide-spread abundance of fish and other creatures in these Bermudian waters. If the latter is true, the trawling nets must be exceedingly ineffective.

The latter theory seems more tenable for a number of reasons. One is the very noticeable fact that no organism, small or large, vertebrate or invertebrate, at the greater depths, shows the slightest positive phototropism. Even when our light has been turned on for several minutes at a time, not a copepod, worm or fish is seen at or approaching the starboard, or lighted, window. The great number of organisms which constantly pass through or along the brilliant path or the beam shows no general tendency to turn toward or away from the source of illumination.

The distance to which the electric beam of light penetrates has been conjectured to be thirty to forty feet, judging by the appearance of fish of known actual size (such as *Argyropelecus*), when they first appear in the farthest end of the light. On Dive Number 32 I took down a pair of three-power Zeiss binoculars, and at 1,500 feet and again at 3,000 I focussed carefully on organisms at the very extremity of the light. I found the one focus was the same as the other. Without altering the glass, I brought it to focus on a given point on the deck, and found the distance to be forty-five feet.

While the pressures at all depths are well known, it may be interesting to note that at 3,028 feet, or 504 fathoms, the pressure was 1,360 pounds to the square inch; each quartz window sustained a weight of 19.2 tons; and the total pressure on the whole bathysphere was 7,016 tons.

# OBITUARY

## JAMES MARK BALDWIN

1861-1934

JAMES MARK BALDWIN died on November 8, in Paris, which was his residence for twenty-five years. A memorial service was held in his honor by the French Academy of Moral and Political Sciences, of which he was a corresponding member. Baldwin belongs to the small company of psychologists who put American psychology on its feet. The original triumvirate was James, Hall and Ladd. Boring, in his history of "Experimental Psychology," speaks of the '90's as "a furious decade in American psychology."

The activity was pioneering, probing as well as controversial. Baldwin was more like Ladd in his approach to psychology, beginning at Princeton with a ministerial goal. A year at Berlin and Leipzig (1884-1885) fixed his allegiance to the "new" psychology. An instructorship at Princeton, a professorship at Lake Forest University, set his teaching in philosophy. A call to Toronto in 1889—still to a chair of metaphysics and logic—he converted into an opportunity to found a small laboratory, the first under British auspices. In 1893, he became professor of psychology at Princeton, established its psychological laboratory, and in 1908 reestablished Hall's lapsed laboratory at Johns Hopkins University. In 1908 he withdrew. The remainder of his life was spent on foreign soil. He paid two visits to Mexico, advising on the establishment of a national university, and giving courses of lectures. He held no position in Paris, but delivered several courses of lectures during his long residence. The major record of his career is in his writings—an extensive array.

As an organizer of psychological activity, he was associated with James McKeen Cattell—the present dean of American psychologists, and our foremost coordinator, not only of psychology but of science generally—in founding the *Psychological Review*, which developed into a group of supporting periodicals, still the central depository of psychological science. In 1903 the *Review* became Baldwin's property; it was later acquired by the American Psychological Association. The *magnum opus* in cooperation was the "Dictionary of Philosophy and Psychology" in two large volumes (1901-1902), which marks a definite advance in the establishment of psychology as a major discipline. Upon the foundations of the '90's the present expansion of psychology in America, unparalleled elsewhere, has been built. A grateful tribute of obligation is due to James Mark Baldwin for his pioneering services.

He was among the first to prepare adequate psychological texts for the classroom. In view of later relations, his translation in 1902 of Ribot's "German

Psychology of To-day"—a Frenchman's tribute to German scholarship—makes a picture of contrast within a lifetime.

The definite indication of his dominant interests appeared in his volumes on "Mental Development in the Child and the Race" (1894), continued in further volumes on "Interpretations" and "Evolution." Baldwin left his impress on the genetic and evolutionary concepts in their formative years. He had a considerable share in Darwinizing psychology, uniting its individual and its social implications. His principle of "organic selection" is a biological contribution.

In his Paris period, the philosopher-turned-psychologist—Boring's phrase—became a genetic logician. The term "logic" he conceived in a generalized sense as the summary of the total range of processes by which the human mind, operating as an instrument of knowledge and a medium of self-expression, shaped its course. "Thought and Things or Genetic Logic" expanded into three volumes (1906-1911), with further philosophical interpretations—"Genetic Theory of Reality" (1905). There is equally an "affective logic"—the technique of the emotions.

During the war, as he graphically relates, action crowded out thought. His views appeared in "French and American Ideals" (1914), "France and the War" (1916), "American Neutrality" (1916) and in a brochure in French. He took an active part in facilitating the mutual understanding of French and American allies.

James Mark Baldwin was born in South Carolina, of a prominent family with Northern sympathies. He had the Southerner's geniality; an engaging personality making friends readily. The same vigorous, natural quality appears in his writings, a happy literary style, a fertility in statement. He believed strongly in the personal expression and the value of theories as a method of reaching truth. If, as Boring comments upon his theories, "he wrote them out of himself," the circumstance may be both a tribute to his insight and a critique of his failure to grasp the full import of the foundations which modern psychology had to establish to keep in step with the rapid and critical pace of modern science.

The fact that, during the most active period of American psychology, Baldwin was out of the scene should not stand in the way of a generous appreciation of his notable place in the establishment of psychology in its critical years. He expressed the same apprehensions voiced by William James that the experimental trend would tether the interests of psychology to limited pastures. His conviction—unmistakably in the temper of a philosopher-turned-psychologist—led him to focus upon a group of prob-

lems in genetic logic, which were not central to the major avenues of progress, and could be made so only by reinvestigation under the clues of anthropology and the naturalistic concept of psychology.

There is thus both in his life and work an element of detachment and estrangement. Such movements as behaviorism and psychoanalysis he regarded as obstructing the legitimate program of psychology and derogatory to its reputation.

The great majority of present-day psychologists knew him not; his name stands to them for little; his contributions carry an old-time flavor. While he can not be rated as a great psychologist—for he lacked the intensive grounding in the cognate sciences to support his major interests—he belongs to the group of stalwart pioneers whose devotion to their profession was expended wisely and well. American psychologists join in a tribute to the memory of James Mark Baldwin.

JOSEPH JASTROW

## RECENT DEATHS

DR. ERNEST GALE MARTIN, professor of physiology at Stanford University since 1916, died on October 17 at the age of fifty-eight years.

GEORGE B. MORTIMER, professor of agronomy at the University of Wisconsin, died on November 18. He was fifty-two years old.

DR. CORNELIUS GODFREY COAKLEY, for twenty years professor of laryngology and otology at the College of Physicians and Surgeons, Columbia University, died on November 22 at the age of seventy-two years.

DR. ELAM BARTHOLOMEW, curator of the Mycological Museum at Fort Hays Kansas State College, died on November 18. He was eighty-two years old.

DR. WILLEM DE SITTER, professor of astronomy at the University of Leiden, died on November 21 at the age of sixty-two years.

## SCIENTIFIC EVENTS

### THE WAYMAN CROW HALL OF PHYSICS AT WASHINGTON UNIVERSITY

To celebrate the formal opening of Wayman Crow Hall, the new home of the Department of Physics of Washington University, the American Physical Society meets on November 30 and December 1 on the campus. Chancellor George R. Throop will deliver a brief address on Wayman Crow, and Dr. Arthur L. Hughes, head of the department of physics, will speak on scientific research at Washington University. About 150 members of the society, including many of the foremost physicists in the country, will be present to read and discuss technical papers and to inspect the building.

The total cost of the building was \$257,000 of the original gifts, from two anonymous donors, of \$700,000. Of the remainder, \$93,000 has been set aside as a maintenance fund and \$350,000 will be used toward furthering the teaching and research work of the department. Construction of the new building on the main campus was begun during the summer of 1933, and completed last summer. Classes have been regularly held in Crow Hall this semester.

The building, which is 175 feet long and varies in width from 52 to 105 feet, forms the first unit of a proposed new engineering group for which plans were set up some time since. It is in Tudor Gothic style of architecture similar to the other buildings on the main part of the campus, and is constructed of native Missouri granite and Bedford limestone. It contains a ground or basement floor and two main floors above. On the ground floor are the research rooms for the regular staff and advanced students. On the first

floor are classrooms, large and small, offices, library, etc., and on the second floor the main laboratories for the instruction of engineering and college students. There is also a sub-basement, 33 x 66 feet, artificially ventilated, for the purpose of experiments with constant temperatures and for experiments calling for freedom from earth vibration. A large tower measuring 42 x 48 feet is above the second story. This affords, through shafts to the sub-basement, opportunity for experiments with falling bodies from a considerable height.

### AWARDS OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

WILLIS H. CARRIER, of Newark, N. J., has been awarded the medal of the American Society of Mechanical Engineers for 1934 "in recognition of his research and development work in air conditioning."

Mr. Carrier is chairman of the board of the Carrier Engineering Corporation, the Carrier Corporation, the Carrier Manufacturing Corporation and the Carrier Engineering Company, Ltd., London. He was born in Angola, N. Y., on November 26, 1876, and attended high school in Angola and Buffalo. He was graduated from Cornell in 1901 with the degree of electrical engineer. Mr. Carrier, pioneer in air conditioning, is the author of many scientific papers, one of which, "The Rational Psychometric Formulae," published in 1911, presented the theory now accepted as to evaporation of moisture.

He is past president of the American Society of Refrigerating Engineers and of the American Society of Heating and Ventilating Engineers. He became an

associate member of the American Society of Mechanical Engineers in 1905, and a member in 1912.

The medal of the American Society of Mechanical Engineers was established in 1920, and is awarded for distinguished service in engineering and science. Previous recipients were Hjalmar Gotfried Carlson, Frederick Arthur Halsey, John Ripley Freeman, R. A. Millikan, Wilfred Lewis, Julian Kennedy, William Le Roy Emmet, Albert Kingsbury and Ambrose Swasey.

Ralph E. Flanders, of Springfield, Vt., was awarded the Worcester Reed Warner gold medal for his "contributions to a better understanding of the relationship of the engineer to economic problems and social trends." This medal was established by the will of Worcester Reed Warner, of the firm of Warner and Swasey, Cleveland, and an honorary member of the society. Mr. Flanders was recently elected president of the society for 1935. He is president of the Jones and Lamson Machine Company, and is a member of the Business Advisory and Planning Council appointed by Secretary of Commerce Daniel C. Roper. For many years he has been a leader in the public service activities of the engineering profession, and has been actively identified with the Federal recovery program. Mr. Flanders is the second Warner medalist, the first award having been made to Dean Dexter S. Kimball, of Cornell University, in 1933.

#### AWARD OF THE JOSEPH LEIDY MEDAL BY THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THE fourth award of the Joseph Leidy medal "for the best publication, exploration, discovery or research in the natural sciences" has been made to Gerrit Smith Miller, Jr., curator of mammals in the United States National Museum at Washington. Mr. Miller was selected by the committee for "his extensive and fundamental studies on the structure, classification, distribution and evolution of the Mammalia, particularly of the Chiroptera (bats), the mammal faunas of North America, Western Europe, Southeastern Asia and the East Indies, and the Pleistocene and sub-fossil West Indian members of the group, as well as his comprehensive classification of the voles and lemmings of the entire world."

The medal and honorarium accompanying it will be presented to him at a special meeting to be held in the academy on Wednesday afternoon, December 5, at 4 o'clock. The committee on this award consisted of Dr. E. G. Conklin, professor of biology, Princeton University, and vice-president of the academy, *chairman*; Dr. Robert A. Harper, emeritus professor of botany, Columbia University; Dr. Henry A. Pilsbry, curator of mollusca of the academy; Dr. Joseph Grinnell,

director of the Museum of Vertebrate Zoology at the University of California, and James A. G. Rehn, secretary and curator of entomology of the academy.

Mr. Miller, who was born in Peterboro, New York, was graduated from Harvard University in 1894, and four years later was appointed assistant curator of mammals in the U. S. National Museum. In 1909 he became curator of the same department, which post he still holds. At one time he was assigned to the British Museum (Natural History) for the preparation of his Western European monograph. His contributions number more than three hundred titles, of which the best known volumes are "The Families and Genera of Bats"; "Catalogue of the Land Mammals of Western Europe" and several catalogues (1902 and 1911) of the mammals of North America.

The first award of the Leidy Medal was made in 1925 to Dr. Herbert Spencer Jennings, of the Johns Hopkins University, for his researches upon the Protozoa and the Rotatoria. The second award, in 1928, was made to Dr. Henry A. Pilsbry, curator of mollusca of the Academy of Natural Sciences of Philadelphia, in recognition of his researches upon the phylogeny of the terrestrial mollusca, and his work on the classification of the Cirripedis. The third award of the Leidy Medal was made in 1931 to Dr. William Morton Wheeler, professor of entomology at Harvard University, in recognition of his researches and studies on the ants of the world and his contributions to animal evolution and psychology.

#### AWARDS AND OFFICERS OF THE ROYAL SOCIETY

THE following is a list of those to whom the Royal Society has this year awarded medals:

The Copley Medal to Professor J. S. Haldane in recognition of his discoveries in human physiology and of their application to medicine, mining, diving and engineering.

The Rumford Medal to Professor W. J. de Haas for his researches on the properties of bodies at low temperatures and, in particular, for his recent work on cooling by the use of adiabatic demagnetization.

A Royal Medal to Professor S. Chapman for his researches in the kinetic theory of gases, in terrestrial magnetism and in the phenomena of the upper atmosphere.

A Royal Medal to Professor E. D. Adrian for his work on the physiology of nerve and its application to the problems of sensation.

The Davy Medal to Professor W. N. Haworth for his researches on the molecular structure of carbohydrates.

The Darwin Medal to Professor A. C. Seward in recognition of his work as a paleobotanist.

The Sylvester Medal to Earl Russell for his distinguished work on the foundations of mathematics.

The Hughes Medal to Professor K. M. G. Siegbahn in recognition of his work as a physicist and technician on long-wave x-rays.

The following names have been proposed for election as officers and council for the ensuing year: *President*, Sir Frederick Gowland Hopkins; *Treasurer*, Sir Henry Lyons; *Secretaries*, Sir Henry Dale and

Sir Frank Smith; *Foreign Secretary*, Professor A. C. Seward. Other *Members of Council*, Professor E. D. Adrian, Dr. E. J. Butler, Dr. W. T. Calman, Mr. D. L. Chapman, Professor A. W. Conway, Professor W. H. Eccles, Professor T. R. Elliott, P. P. Laidlaw, Sir Gerald Lennox-Conyngham, Professor J. C. McLennan, Dr. F. H. A. Marshall, Sir Charles Martin, Professor G. T. Morgan, Professor R. Robison, Dr. Herbert H. Thomas and Professor E. T. Whittaker.

## SCIENTIFIC NOTES AND NEWS

THE Mary Clark Thompson Medal, awarded for important services to geology and paleontology, was presented to Dr. Charles Schuchert, of Yale University, at the dinner of the National Academy of Sciences at Cleveland. The presentation address by Dr. David White, chairman of the committee of award, was read by Dr. Fred E. Wright, home secretary of the academy.

A BRONZE plaque, the annual award for meritorious service in the fields of medicine and science given by the New Jersey Health and Sanitary Association, was presented *in absentia* on November 16 to Dr. Theobald Smith, emeritus member of the Rockefeller Institute for Medical Research, who was from 1915 to 1929 director of the department of plant and animal pathology at Princeton.

DR. ARTHUR H. COMPTON, professor of physics at the University of Chicago, was awarded the honorary degree of master of arts on the occasion of the opening of his lectures as George Eastman visiting professor at the University of Oxford.

SIX Townsend Harris Medals were awarded to alumni of the College of the City of New York "for achievement and for their service to the college" at the fifty-fourth annual dinner of the Associate Alumni. One of these was presented to Dr. Frank Schlesinger, director of the Yale Observatory. The citation was as follows: "Frank Schlesinger, '90, worthy successor of Copernicus and of Galileo, leading scholar in the great University of Yale, you have helped men to understand the expanse and the mystery of the universe. What your own eyes have seen and what, through the medium of great telescopes from New Haven to Johannesburg, you have enabled other men to see has vastly enriched the world's knowledge of the most ancient of the sciences. In you *alma mater* finds particular reason to rejoice."

At a meeting of the Institute of Fuels, London, on November 10, the Melchett Medal was presented to Dr. Friedrich Bergius, the German chemist, who was the pioneer in the extraction of oil from coal and is

now experimenting in the production of sugar from wood.

DR. F. L. McVEY, president of the University of Kentucky, was elected president of the Association of Land Grant Colleges and Universities at the recent Washington meeting. Dean J. G. Lipman, of the College of Agriculture at Rutgers University, was elected vice-president; Dean Thomas P. Cooper, of the University of Kentucky College of Agriculture, was re-elected secretary, and Dean F. B. Mumford, of the University of Missouri College of Agriculture, was reelected for a five-year term on the executive committee.

LORD D'ABERNON, chairman since 1929 of the British Medical Research Council, has been elected a fellow of the Royal Society under Rule 12, which provides that the council may recommend for election in any calendar year not more than two persons who "have rendered conspicuous service to the cause of science, or are such that their election would be of signal benefit to the society."

THE Marchese Marconi was elected rector by a majority of a hundred votes over the other candidate, Sir James Jeans, as the result of the St. Andrews University rectorial election.

DR. A. E. JOLLIFFE, professor of mathematics in the University of London and formerly mathematical lecturer of Jesus College, University of Oxford, has been elected an honorary fellow of the college.

ACCORDING to the *Journal* of the American Medical Association, the All Russian Executive Committee has given the title "honorary workers of medicine" to the following Russian professors: Professor Serge N. Davidenkov, of Leningrad, for research in neuropathology, biology and genetics; Professor Leo A. Orbeli, who occupies the chair of physiology in the Military Medical Academy and in the All-Union Institute of Experimental Medicine; Professor Andreas, surgeon; L. Polenov, who in 1926 established the first chair of neurologic surgery in the Soviet Union; Professor Ludwig I. Svergeevsky, specialist in ear and

throat diseases; Professor Serge U. Spasocucotzky and Professor George N. Speransky, pediatrician, one of the founders of the Institute for Studying Motherhood and Childhood.

At the autumn meeting of the Board of Trustees of the American Museum of Natural History it was voted to award distinguished memberships to several men for service to the museum. William K. Vanderbilt and Edmund B. Rogers were made associate benefactors; Harry Snyder, a patron; E. L. Bell, a fellow, and Raymond Guest and Kerr Rainsford, life members. Dr. A. B. Klots was elected honorary life member for his work in entomology, and Frederick H. Osborn was appointed research associate in anthropology.

OFFICERS of the American Pharmaceutical Association have been elected as follows: *President-elect*, Patrick H. Costello, Cooperstown, N. Dak.; *First vice-president elect*, Frank A. Delgado, Washington, D. C.; *Second vice-president elect*, J. Lester Hayman, Morgantown, W. Va.; *Members-elect of the Council*, James H. Beal, Fort Walton, Fla.; C. H. LaWall, Philadelphia, Pa.; R. L. Swain, Baltimore, Md. These officers will be installed at the next annual meeting of the association, which will be held in Portland, Oregon, at a time to be announced later.

L. E. NOLLAU, professor of mechanical drawing in the University of Kentucky College of Engineering, has been elected president of the Kentucky section of the Society for the Promotion of Engineering Education.

At the close of the ninth Pan American Sanitary Conference on November 22 officers were elected as follows: Surgeon-General Hugh S. Cumming, of the United States Public Health Service, was reelected director-general of the Pan American Sanitary Office, Dr. Gregorio Araoz Alfaro, of Argentina, honorary president. Other officers are Dr. Carlos Enrique Paz Soldan, of Peru, *vice-president*; Dr. Carlos J. Mongo, of Peru, *alternate vice-president*; Dr. Justo F. Gonzalez, of Uruguay, *secretary*; Dr. Rafael Schiaffino, of Uruguay, *alternate secretary*. Dr. Jorge Bejarano, of Colombia, was elected organizing president for the next conference, which will be held at Bogota.

DR. WILLIAM CLIFFORD MORSE, for sixteen years professor of geology at Mississippi State College, has been called to the University of Mississippi to be head of the department of geology and director of the Mississippi Geological Survey.

DR. ELMER PETER KOHLER, who since 1914 has been Abbott and James Lawrence professor of chemistry at Harvard University, has been elected Sheldon Emery professor of organic chemistry. Dr. Lawrence Joseph Henderson, who has been professor of bio-

logical chemistry, has been elected to succeed Professor Kohler as Abbott and James Lawrence professor of chemistry.

DR. THEOPHIL H. HILDEBRANDT has been appointed chairman of the department of mathematics at the University of Michigan. He succeeds Professor James W. Glover, who resigned in order to devote more of his time to research problems and investigations dealing with the federal government plans for economic security for the individual. Professor Glover has not left the university faculty, but remains as "James Olney distinguished professor."

DR. THOMAS PARRAN, JR., New York State Commissioner of Health, resigned on November 20 from the public health committee of the National Advisory Council on Radio in Education. He is said to have taken this action because at the last minute he was barred by the Columbia Broadcasting System from any mention of "syphilis control." He was expected to speak in New York City on November 26 on "Public Health Needs," giving a brief non-technical reference to life-saving possibilities through scientific action to control the disease.

At the annual meeting on November 21 of the trustees of the Carnegie Foundation for the Advancement of Teaching, Dr. Walter C. Murray, president of the University of Saskatchewan, Canada, was elected *chairman*; Thomas W. Lamont was elected *vice-chairman*, and Dr. Frederick C. Ferry, president of Hamilton College, *secretary*. New trustees elected were Dr. E. H. Lindley, chancellor of the University of Kansas; Dr. Edward C. Elliott, president of Purdue University, and Dr. James Bryant Conant, president of Harvard University.

THE American Academy of Arts and Sciences has extended for the third year a grant-in-aid to Dr. Bret Ratner in the pediatrics and immunology departments of New York University and Bellevue Medical College, furthering his studies on experimental asthma in the guinea pig.

GRANTS from the Alexander Dallas Bache Fund of the National Academy of Sciences were made by its Board of Directors, consisting of W. J. V. Osterhout, E. B. Wilson and Heber D. Curtis, *chairman*, at the Cleveland meeting of the Academy as follows: to Dr. Frank C. Jordan, Allegheny Observatory, Pittsburgh, for assistance in measuring and reducing plates for stellar parallax; to Dr. T. T. Chen, Osborn Zoological Laboratory, New Haven, for studies on Opalinid ciliate protozoa; to Dr. Dean B. McLaughlin, the Observatory of the University of Michigan, for researches on peculiar and variable stellar spectra; to Dr. Harold Heath, Hopkins Marine Station, Pacific Grove, California, for an investigation of termite castes.

DR. K. T. WATANABE, of Osaka, and Dr. Masao Muto, of Sendai, Japan, were guests of the Wistar Institute on November 11. Dr. Muto is an associate of Dr. Shinkishi Hatai, formerly a member of the institute, now director of the Biological Institute of the Tohoku Imperial University in Sendai.

DR. P. A. VAN DER BIJL, professor of plant pathology and mycology at the University of Stellenbosch, South Africa, has been visiting laboratories of phytopathology and mycology in the United States.

A JOINT expedition, arranged by Washington University and the Missouri Botanical Garden to seek plant specimens in the jungles of Panama, has sailed from New Orleans. Members of the party are Dr. Carroll W. Dodge, mycologist at the garden and a member of the Washington University faculty; Dr. Julian Steyermark, formerly graduate student in botany at Washington University, and Paul Allen, student at the garden. The expedition is being partly financed from the Science Research Fund of Washington University, given by the Rockefeller Foundation.

DR. THOMAS H. JOHNSON, of the Bartol Research Foundation, has returned from a three months' trip to Colorado and Mexico which was undertaken for the purpose of measuring the east-west asymmetry of the cosmic radiation at various elevations and latitudes. Extensive observations were made at Mt. Evans and Echo Lake in Colorado and at Nevado de Toluca, Villa Obregon, Vera Cruz and Parral in Mexico. The survey was a continuation of that begun last year as a part of the program authorized by the Cosmic Ray Committee of the Carnegie Institution of

Washington and it was financed by a grant from that institution. Dr. Johnson was assisted by Lewis Funsell, Jr.

DR. GLEB V. ANREP, professor of physiology at the Egyptian University, Cairo, will deliver the 1935 series of Lane Lectures at Stanford University School of Medicine in April. The five lectures will cover different phases of "Regulation of the Cardio-Vascular System."

DR. H. E. EWING, entomologist in the Bureau of Entomology and Plant Quarantine, has accepted an invitation to deliver ten lectures to the class in medical entomology at the Johns Hopkins University School of Hygiene and Public Health.

THE third Harvey Lecture of the New York Academy of Medicine will be given by Dr. Wilbur A. Sawyer, associate director of the International Health Division of the Rockefeller Foundation, on Thursday evening, December 20, at eight-thirty, on "The Present Geographical Distribution of Yellow Fever and its Significance." The fourth lecture will be given on January 17, by Professor Alfred N. Richards, professor of pharmacology, University of Pennsylvania, on "Processes of Urine Formation in the Amphibian Kidney."

THE first Friday evening discourse of the new session at the Royal Institution was delivered on November 2 by Dr. F. W. Aston, who took as his subject "Elements and Isotopes."

THE annual meeting and dinner of the New York Academy of Sciences will be held on Monday, December 17.

## DISCUSSION

### THE SEQUENCE OF INFECTION, ALLERGY AND RESISTANCE AS REPRESENTED BY X-RAYS IN HUMAN PULMONARY TUBERCULOSIS

BROADLY speaking, the course of tuberculosis represents an immunologic conflict between the host tissues on the one hand and invading tubercle bacilli on the other. This note is founded on a "case" in which the organic and symptomatic manifestations of the disease were correlated with certain theoretical tenets generalized from animal experimentation; it emphasizes the opinion that, interpreted through a code such as follows, an obscure pathologic history may sometimes be resolved into an intelligible story:

(1) Introduction of living tubercle bacilli into a healthy living body leads to functional changes

through which the tissues become thereafter *hypersensitive* to contact with tubercle-protein ("antigen")—an admitted fact. (2) The hypersensitive tissue has undergone a physico-chemical change which has two functional aspects: (a) Specific resistance is opposed to the passage of tubercle bacilli over it; (b) the hypersensitive tissue becomes the seat of biologic reaction, directed either to the immediate destruction of tubercle bacilli, probably by lysis, or to their incarceration and fixation *in situ* in tubercles. The intensity of both these functional changes probably decreases with the distance from the infective foci. (3) In an acutely tuberculous subject even slight physical exercise causes inflammatory congestion about tubercles and *pari passu* vascular engorgement in their vicinity. The same reaction may be

caused experimentally and quantitatively by hypodermic injection of tuberculin.

The evidence of vascular congestion as depicted on the roentgenogram is a valuable index of a resting patient's allergic susceptibility, or its absence after exercise, of acquired resistance.

(4) It probably frequently happens, as in our case, that the anti-bacterial lytic power in proximity of the primary focus of infection is so strong that the development of tubercles there is wholly prevented, and through continuance of rest allergy and fever subside and a feeling of normal well-being is restored. But, nevertheless, this is a critical period; for the hitherto unaffected contralateral lung may simultaneously, without morbid symptoms, become the seat of congestion and deposition of miliary tubercles. Such an occurrence finds plausible explanation if we suppose that specific hypersensitiveness of the contralateral lung causes fixation of intruding tubercle bacilli which the local tuberculolytic power is not sufficiently developed to dissolve, the forces of tissue resistance being constrained to the more leisurely process of tubercularization. With continuance of mental and physical rest complete annihilation of these foci of disease may occur through absorption, fibrosis or calcification. On the other hand, it seems probable that in neglect of such precautionary rest we have the explanation of the serious problem of the actively tuberculous contralateral lung.

The case here recorded was pictured throughout its course by a medical roentgenologist, Kenneth D. A. Allen, and will be described fully in an early issue of the *American Review of Tuberculosis*.

HENRY SEWALL

DENVER, COLORADO

# THE ROLE OF DAMPING-OFF DISEASES IN RELATION TO FAILURES OF ALFALFA STANDS ON SOME ACID SOILS<sup>1</sup>

A DAMPING-OFF disease of alfalfa has been found to be associated with acidity in three Iowa soils. Alfalfa seedlings grown in the field during June, 1933, on acid Clarion loam and Tama and Webster silt loams were 41, 48 and 16 per cent. diseased, respectively, while on neutral Clarion and Webster silt loams only seven and six per cent., respectively, were diseased. In germination and emergence stages, infected alfalfa seedlings are rapidly invaded, so that complete collapse and general necrosis takes place in less than 24 hours. Older seedlings appear to be less susceptible to general invasion and necrosis, but until the plants are fully established the parasite seems able to produce local lesions on the hypocotyls and primary roots.

Isolations from recently collapsed tissues of infected seedlings appear by their mycelial characters and their habit of conidia or sporangia production to be species of the genus *Pythium*. Infection trials with these cultures on alfalfa seedlings grown in sterile soil indicate that they are pathogenic.

When acid soil was steamed for two hours at 15 pounds or treated with  $\frac{1}{2}$  per cent. formaldehyde it grew a higher percentage of healthy alfalfa seedlings than did untreated neutral soil. There has been some indication that limestone and hydrated lime will inhibit damping-off in acid soil. Less damping-off of alfalfa seedlings occurred in pots of acid soil at a temperature of 9° C. than in similar pots kept at 20–25° C.

It seems highly probable that we have overlooked the rôle of damping-off fungi incident to failure of alfalfa stands on some acid soils.

WALTER F. BUCHHOLTZ

IOWA AGRICULTURAL EXPERIMENT STATION

## WANTED: HALOS IN MICA

THERE are four main types of methods of determining geologic ages: (a) By the ratio of the radioactive lead produced by the decay of uranium, thorium or actinium to the amount remaining. This has been mainly successful with minerals containing these elements in quantity. When the mineral is obtainable in quantity so that one can obtain the lead isotopes or atomic weight,<sup>1</sup> it is reliable, especially if the age is confirmed on various minerals containing lead from different elements.

(b) By the helium produced. This has been most successful in fine-grained traps and meteorites in the hands of Paneth and Urry<sup>2</sup> where very minute quantities are present.

(c) By the loss of radium owing to its decay, as applied by H. Schlundt to recent tufas.<sup>3</sup>

(d) By the halo rings of discoloration around minute particles of radioactive matter enclosed in mica. This was first suggested by Joly, but Professor G. H. Henderson, of Dalhousie University, Halifax, Nova Scotia, has opened a vista of promise by devising a method of comparing the relative strength of the rings produced by elements that have different rates of decay.<sup>4</sup>

I am delighted to hear that the Carnegie Corporation of New York has granted aid in his researches. Geologists and mineralogists should help by provid-

<sup>1</sup> Confer von Grosse or J. P. Marble, *Jour. Am. Chem. Soc.*, 56: 854, 1934.

<sup>2</sup> *Chem. Review*, 13: 305–346, 1933.

<sup>3</sup> Report of the Committee on the Measurement of Geologic Time, 1934, page 34.

<sup>4</sup> *Proceedings of the Royal Society A*. 145: 563–598, 1934.

<sup>1</sup> Journal Paper No. J 190 of the Iowa Agricultural Experiment Station, Ames, Iowa. Project No. 77.

ing suitable material. Hence this note! By suitable material I mean biotite (not muscovite), in flakes of a centimeter in diameter, whose geological provenance is known. I would therefore appeal to geologists and mineralogists to help—not by deluging him with mica, but, in case they find suitable material, by let-

ting him have some. Rock sections can not be used at present.

ALFRED C. LANE,  
Chairman, Committee on the Measure-  
ment of Geologic Time, National Re-  
search Council

## SCIENTIFIC BOOKS

### THE DYNAMICS OF POPULATION

*Dynamics of Population. Social and Biological Significance of Changing Birth Rates in the United States.* By FRANK LORIMER and FREDERICK OSBORN. New York (Macmillan), 1934. Pp. xiii + 461. \$4.00.

BECAUSE population is so evidently an important factor in all major social and economic problems its movements have come to the front as a paramount issue in human biology in the period since the world war left all mankind in an uncommonly difficult and troubled situation. In 1918 little that was precise and penetrating was known about population problems. In consequence they became a glittering target for the artillery (or should we say archery) practise of viewers-with-alarm, pseudo-scientific exhorters, God-sakers and other assorted uplifters. Attitudes have changed rapidly in the field. A decade ago the horrid bugaboo was overpopulation; of late it is that mankind is shortly to perish miserably because of its careless inattention to the business of reproduction, or alternatively its reluctance to pursue adequately and diligently so inherently pleasant a duty. But nothing is surer than that earnest exhorters in however noble a cause become bores; quickly, easily and how profoundly. Everybody is getting wearied of sermons about population, as began to be the case a little earlier about its sub-department of eugenics. What is wanted instead is sober, critical appraisal of the pertinent facts, and their extension by further really scientific investigations, unmarred by moral judgments or indignation.

It is in just this direction that Lorimer and Osborn have made a first-rate contribution. At the expense of obviously great and painstaking labor they have brought together, critically digested and assimilated into a reasonably unified whole a large body of factual data. They have done this with a coldly critical eye first to the selection only of material that has some degree at least of quantitative precision, soundness and relevance. In addition they have, wherever possible, extended the usefulness and meaning of the data by working them over, to use the cant phrase of the laboratory, getting out of them in this way all the information they were capable of yielding.

*Dynamics of population* is divided into four main

parts, each containing several chapters. These parts deal respectively with population trends of American groups; the measurable characteristics of these groups; the influence of differential reproduction on the characteristics of the American people; and, finally, the causes and control of population trends. The discussion of these matters takes up just under 80 per cent. of the volume, the remainder being devoted to detailed appendices, excellent extensive bibliographies and really adequate indices.

The attitude of the authors toward their work is stated in this way:

It has not been the purpose of this book to define a population policy for the United States or propose a program of practical eugenic activity. We shall be satisfied if we have presented a fair picture of the changes which are taking place in our population, of their causes and of their social consequences. But the problems raised are so new as subjects of serious study, that the question is still constantly asked, "Are the forces that determine population change in any way subject to social control?" as though we were dealing with something mysterious or outside the realm of reasonable social concern. It is our belief that the causes of population change are just as capable of being placed under social control as are the forces influencing health, economic processes, or other human activities.

The first part of this platform is maintained throughout the book, with admissible restraint and critical intelligence. And surely it is only fair to allow such conscientious and hard-working authors a little indulgence for the exhibition of their pious beliefs, piety being inherent in man. But one can not help wishing that Mr. Osborn would now turn to and write another book telling us about the "social control" of "economic processes." For the most cursory examination of one's own investment portfolio suggests that the "control" in this sphere has fallen something short of an at least naively conceivable ideal.

The conclusions of the four parts of the book may in the space of a review, be only briefly and inadequately indicated. In the main they are not novel as is to be expected from the nature of the book. But they are evaluated with real critical acumen. The United States population as a whole is held to be approaching a stationary condition. Its era of mo-

rapid growth is past. Its reproductive differentials are, in general, negatively correlated with social, economic and occupational status. But it is to be noted that these three are not independent variables, but on the contrary correlated with each other. Because of these reproductive differentials the future composition of the population, from whatever point viewed, is likely to be divergent from its present one. On this account the authors are rightly cautious about making predictions. No important differences in reproductive performance are found between large racial or national groups in our population. The authors are soundly skeptical about theories of "optimum population" numbers. "The accumulation of surplus population in agriculture areas with limited natural resources" is looked upon as the most serious economic aspect of present population trends. There is found also a trend towards an increase in families with the background of unskilled laborers in a time when the demand for manual labor is plainly contracting rather than expanding, and is likely to continue to do so with the steady progress in the application of science to all processes of industrial production.

The militant eugenicist seems likely to derive singularly little warming or cheering sustenance from this book. For it is found that the only point at which anything like convincing evidence of hereditary differences playing an important rôle in large population groups is in relation to the occupational classification. There are three studies in this field regarded by the authors as worthy of some credence, and they indicate "that from one third to one half of the variations usually found among occupational classes in average levels of cultural-intellectual development are due to deviations in hereditary capacities." After some cautionary reservation about this conclusion the authors go on to state that they regard it as conclusively proved that the apparent differences in cultural-intellectual development between major racial groups are due in large part to environmental rather than hereditary influences. They find it even more true that there appear to be no significant differences in hereditary capacities for intellectual development between large social, or urban *versus* rural, groups. They are also extremely skeptical as to the existence of hereditary differences in vitality (health and longevity) between large groups, either regional,

racial or social, admitting at the same time the cogency of the evidence of the importance of hereditary factors in determining inter-individual differences in respect of health and longevity.

The general conclusion of the whole survey seems sound and intelligent.

Our vast educational program may perhaps be sufficient to outweigh the depressing effects of present population trends in their purely environmental aspects. It can never make up for the dying out of any large proportion of people with superior capacities for education. Two mass tendencies are apparently moving in direct opposition: the conscious force of educational endeavor, and the blind influence of present population drift.

Thus many of the present varying rates of reproduction of American groups are bad from the economic, the cultural, or the eugenic point of view. There is, however, an encouraging indication that present differences in reproduction rates are in part the expression of an incomplete social process; some of the most extreme differentials in fertility among American groups are likely to disappear as current changes in attitudes and behavior, already established in a large portion of the population, spread to more isolated, less privileged, and less developed groups.

The book is a little marred by some minor defects. Perhaps the worst of these is a tendency to unnecessary over-elaboration of the discussions, with repetitions and some confusion of the reader as consequences. Conciseness of statement would have enhanced the value and influence of the treatise. The discussion of theoretical genetics in the latter part of Chapter X seems unfortunate for two reasons, first because unnecessary to the argument, and second because it partakes rather more of the nature of Alice in Wonderland than of objective, natural science. There is displayed in an otherwise well and abundantly illustrated book a somewhat distressing fondness for "pie" diagrams, a form of graphic representation now commonly avoided by statisticians other than those attached to the advertising business.

But these and some other offenses to some tastes and judgments that might be mentioned are, after all, minor faults, in a really excellent and valuable book that will be welcomed and treasured in the library of every serious student of human biology.

RAYMOND PEARL

THE JOHNS HOPKINS UNIVERSITY

## SPECIAL ARTICLES

### THE ISOLATION OF CRYSTALLINE TRYPSINOGEN AND ITS CONVERSION INTO CRYSTALLINE TRYPSIN

THE isolation of a crystalline protein, chymotrypsinogen, from acid extract of fresh cattle pan-

creas and its conversion into an active proteolytic enzyme, chymo-trypsin, has been previously described.<sup>1</sup> The filtrate from the chymo-trypsinogen

<sup>1</sup> M. Kunitz and J. H. Northrop, *SCIENCE*, 78: 558, 1933.

contains trypsinogen, the inactive form of trypsin, and becomes active upon the addition of enterokinase or upon dissolving in concentrated magnesium or ammonium sulfate.<sup>2</sup> Under the latter conditions the activation is autocatalytic. This trypsinogen has now been isolated in crystalline form as short triangular prisms. It is a protein and has no proteolytic activity but becomes active under the same conditions as does the original filtrate from the chymo-trypsinogen. Thus, on standing in concentrated magnesium sulfate solutions at pH 7.0–8.0 this protein is transformed into the active proteolytic enzyme, trypsin, which may then be crystallized in the form of short rectangular prisms or fine needles. The activation reaction is autocatalytic. The activation curve for the crude trypsinogen solution shows a prolonged lag period due probably to the presence of an inhibiting substance. This prolonged lag period allows crystallization of trypsinogen to take place before activation. The solutions of crystalline trypsinogen, however, activate much more rapidly and there is no lag period. For this reason it has not been possible, so far, to recrystallize the trypsinogen, since the conditions for crystallization are also those for activation. The trypsinogen is, therefore, transformed to active trypsin before trypsinogen crystals can form, and the crystals which later appear are those of active trypsin instead of trypsinogen. Crystalline trypsin obtained in this way is identical, so far as has been determined, with the crystalline trypsin previously isolated from active pancreatic extract.<sup>3</sup>

The method of isolation of these crystalline proteins is briefly as follows. All the solutions used must be cooled to about 5° C. and all operations are carried out in the icebox. The mother liquor from the chymo-trypsinogen crystallization is titrated to pH 4.0 with 2.5 M sulfuric acid, brought to 0.7 saturated ammonium sulfate and filtered. 100 gm of the precipitate is dissolved in 300 ml water, brought to 0.4 saturated ammonium sulfate and filtered. The filtrate is brought to 0.6 saturated ammonium sulfate by slow addition of saturated ammonium sulfate and filtered with suction. The precipitate is washed twice on the filter with saturated magnesium sulfate. Ten gm of filter cake is dissolved in 10 ml 0.4 M borate buffer pH 9.0; 17 ml saturated magnesium sulfate is added and the solution allowed to stand at 6° C. Short triangular pyramids appear in the course of 2 to 3 days. If the solution is inoculated crystallization is much

more rapid, but the crystals are not so well formed. Occasionally the solutions become active and crystallization stops or crystals of the active trypsin may appear.

#### CONVERSION OF TRYPSINOGEN TO TRYPSIN AND CRYSTALLIZATION OF TRYPSIN

Trypsinogen crystals are washed with 0.5 saturated magnesium sulfate in 0.10 M borate buffer pH 8.0 and then with saturated magnesium sulfate in 0.1 M acetic acid. Ten gm filter cake is suspended in 5 ml 0.01 M sulfuric acid and 2.5 M sulfuric acid added drop by drop until the crystals dissolve. Ten ml saturated magnesium sulfate and 5 ml 0.4 M borate buffer pH 9.0 is added and pH adjusted with saturated potassium bicarbonate solution to pink to phenol red on test plate. The solution is inoculated and allowed to stand at about 5° C. A heavy crop of trypsin crystals forms in a few hours. The first crystals may be poorly defined. Recrystallization is carried out in the same way but with slightly more dilute solution of the protein. The crystals are needle-shaped and may be quite short or may appear in rosettes. The purified trypsin obtained from active cattle pancreas, as previously described,<sup>3</sup> may be crystallized under the same conditions. Much better crystals are obtained in this way than when crystallization is carried out at pH 4.0 and room temperature with ammonium sulfate, as in the original method.

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<sup>2</sup> M. Kunitz and J. H. Northrop, *SCIENCE*, 80: 190, 1934.

<sup>3</sup> M. Kunitz and J. H. Northrop, *Jour. Gen. Physiol.* (in press).